NATIONAL GUIDELINE CLEARINGHOUSE™ (NGC)
GUIDELINE SYNTHESIS

ASSESSMENT AND TREATMENT OF OBESITY AND OVERWEIGHT IN ADULTS

Guidelines

1. American College of Preventive Medicine (ACPM). Nawaz H, Katz DL. American College of Preventive Medicine Practice Policy statement. Weight management counseling of overweight adults. Am J Prev Med 2001 Jul;21(1):73-8. [75 references]
2. American Gastroenterological Association (AGA). American Gastroenterological Association medical position statement on obesity. Gastroenterology 2002 Sep;123(3):879-81. [1 reference]
3. Brigham and Women's Hospital (BWH). Obesity in women. A guide to assessment and management. Boston (MA): Brigham and Women's Hospital; 2003. 15 p. [14 references]
4. Singapore Ministry of Health (MOH). Obesity. Singapore Ministry of Health - National Government Agency [Non-U.S.] 2004
5. United States Preventive Services Task Force (USPSTF). Screening for obesity in adults: recommendations and rationale. Ann Intern Med 2003 Dec 2;139(11):930-2. [5 references]

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INTRODUCTION:

A direct comparison of the American College of Preventive Medicine (ACPM), American Gastroenterological Association (AGA), Brigham and Women's Hospital (BWH), Singapore Ministry of Health (Singapore MOH), and the United States Preventive Services Task Force (USPSTF) recommendations for assessment/screening and treatment of overweight and obesity in adults is provided in the tables, below. Table 1 provides the scope of the guidelines, Tables 2 and Table 3 compare the major recommendations, and Table 4 compares the potential benefits and harms of implementing the recommendations. Definitions for the levels of evidence used to support the guideline recommendations for USPSTF and Singapore MOH are given in Table 5.

The comparisons given in the tables are restricted to recommendations for assessment and management of overweight and obesity in the adult population only. Recommendations concerning overweight and obesity in children and adolescents are compared in a separate synthesis Overweight and Obesity in Children and Adolescents: Assessment, Prevention, and Management.

Following the content and recommendation comparison tables, the areas of agreement and differences among the guidelines are identified.

Abbreviations used in the text and table

- ACPM, American College of Preventive Medicine
- AGA, American Gastroenterological Association
- BMI, body mass index
- BWH, Brigham and Women's Hospital
- LCD, low calorie diet

- MOH, Ministry of Health (Singapore)
- USPSTF, United States Preventive Services Task Force
- VLCD, very low calorie diet

TABLE 1: COMPARISON OF SCOPE AND CONTENT	
Objective and Scope	
ACPM (2001)	To present a practice policy statement on weight management counseling of overweight adults
AGA (2002)	To provide gastroenterologists with a comprehensive evaluation of the important clinical issues in adult obesity, including prevalence, etiology, physiology, pathophysiology, medical complications, metabolic and medical effects of weight loss, treatment options, and treatment guidelines
BWH (2003)	To provide physicians with clear clinical pathways to identify and treat obesity
SINGAPORE MOH (2004)	• To assist health care professionals who have a role in managing overweight or obese patients • To provide current evidence-based clinical practice recommendations on various aspects of obesity management found across various medical disciplines • To provide a framework to assist doctors in the management of overweight and obesity without restricting the physician's individual judgment • To provide a review of the various medical, surgical, and ancillary intervention modalities in the management of obesity • To aid primary care physicians in basic management of obesity and subsequent referrals to specialists for more resistant cases
USPSTF (2003)	• To summarize the USPSTF recommendations on screening for obesity in adults based on the USPSTF's examination of evidence specific to obesity and overweight in adults • To update the 1996 recommendations contained in the Guide to Clinical Preventive Services, Second Edition
Target Population	
ACPM (2001)	• United States • General adult population (Counseling/Prevention)

	• Overweight and obese adults (Management)
AGA (2002)	• United States • Overweight and obese adults
BWH (2003)	• United States • Women who are overweight or obese • Women who are at risk of becoming overweight or obese
SINGAPORE MOH (2004)	• Singapore • Adults in Singapore who are obese or overweight, or who are at risk of obesity Note: Children and adolescents are also considered in this guideline; recommendations concerning these younger age groups are covered in a separate synthesis, Overweight and Obesity in Children and Adolescents: Assessment, Prevention, and Management.
USPSTF (2003)	• United States • Adults seen in primary care settings
Intended Users	
ACPM (2001)	Advanced Practice Nurses; Allied Health Personnel; Dietitians; Nurses; Physical Therapists; Physician Assistants; Physicians
AGA (2002)	Physicians
BWH (2003)	Advanced Practice Nurses; Health Care Providers; Physician Assistants; Physicians
SINGAPORE MOH (2004)	Advanced Practice Nurses; Allied Health Personnel; Dietitians; Nurses; Physician Assistants; Psychologists/Non-Physician Behavioral Health Clinicians; Public Health Departments; Respiratory Care Practitioners
USPSTF (2003)	Advanced Practice Nurses; Allied Health Personnel; Dietitians; Nurses; Physician Assistants; Physicians; Psychologists/Non-physician Behavioral Health Clinicians
Interventions and Practices Considered	
ACPM (2001)	Assessment and Preventive Counseling

	1. BMI 2. Weight monitoring 3. Dietary and physical activity counseling Management/Treatment 1. Moderate physical activity 2. Dietary interventions (e.g., energy-reduced or low-calorie diet) 3. Pharmacotherapy, such as sibutramine and orlistat (considered but not specifically recommended) 4. Behavior therapy 5. Surgery (e.g., surgical gastroplasty and gastric bypass)
AGA (2002)	Assessment 1. Medical evaluation, including a careful history, physical examination (including determination of BMI), and laboratory tests 2. Assessment of weight loss readiness Management/Treatment 1. Determination of therapeutic goals, considering patient readiness for obesity treatment and obesity-related health risk 2. Dietary interventions (e.g., reduction of calories through strategies such as portion-controlled servings, prepackaged prepared meals, and liquid formula meal replacements) 3. Physical activity at varying intensities 4. Behavior modification (e.g., self-monitoring activities, consultation with local professionals, group behavior therapy) 5. Pharmacotherapy (e.g., sibutramine hydrochloride [Meridia] and orlistat [Xenical]) 6. Surgery • Procedures primarily for gastric restriction (e.g., gastric bypass and vertical-banded gastroplasty) • Procedures primarily for maldigestion/malabsorption (e.g., biliopancreatic diversion, biliopancreatic diversion with duodenal switch, distal gastric bypass)
BWH (2003)	Assessment 1. BMI 2. Waist circumference 3. Evaluation of risk factors and associated overweight and obesity health risks 4. Identification of potential triggers (e.g., medications, injuries

	and/or medical conditions, smoking status, or behavioral, cultural, and economic issues that impact food choices or exercise options) Treatment/Management/Prevention 1. Goal setting 2. Dietary therapy (including changes in dietary composition and low- or very low-calorie diets) 3. Physical activity and exercise 4. Behavior therapy 5. Pharmacotherapy (including, appetite suppressants [phentermine], serotonergic agonists [sibutramine], and fat malabsorption agents [orlistat]) 6. Avoidance of medications that may contribute to weight gain 7. Surgery (including gastric bypass, vertical banded gastroplasty, and laparoscopic banding) 8. Weight loss maintenance Referrals • Psychiatric and nutrition referrals for binge eating or bulimia
SINGAPORE MOH (2004)	Assessment 1. BMI 2. Waist circumference 3. Evaluation of risk factors for, and secondary causes of, obesity 4. Screening for comorbid conditions 5. Evaluation of patient motivation Management/Treatment 1. Goal setting 2. Dietary therapy (decrease in calorie intake, macronutrient composition, meal size and distribution of food intake during day, low-calorie and very-low calorie diets) 3. Physical activity and exercise 4. Behavior therapy 5. Pharmacotherapy (e.g., orlistat, sibutramine, phentermine, mazindol, metformin) 6. Non-prescription and off-label weight loss supplements 7. Surgery (including, gastric bypass, vertical banded gastroplasty, or laparoscopic banding) 8. Weight loss maintenance Referrals

	• Evaluation for depression and binge-eating disorders with referrals Note: Interventions for assessment and treatment of overweight and obesity in adolescents and children were also considered in this guideline. These interventions are addressed in a separate synthesis Overweight and Obesity in Children and Adolescents: Assessment, Prevention, and Management.
USPSTF (2003)	Assessment/Screening 1. BMI 2. Waist circumference Management Combined counseling and behavioral interventions including: 1. Low-, moderate- and high-intensity counseling 2. Nutritional education 3. Behavioral strategies including the 5-A framework (Assess, Advise, Agree, Assist, and Arrange) Note: Treatment interventions such as medications (orlistat and sibutramine) and surgery (gastric bypass, vertical banded gastroplasty, and adjustable gastric banding) were considered.

TABLE 2: COMPARISON OF RECOMMENDATIONS FOR ASSESSMENT OF OVERWEIGHT AND OBESITY, MOTIVATION TO LOSE WEIGHT, AND PREVENTIVE COUNSELING	
Key Measures (Weight, BMI, Waist Circumference) Overweight/Obesity Classification	
ACPM (2001)	• Periodic measurement of BMI (weight in kilograms/height in meters^2) is recommended for all adults. Although an emphasis on health-promoting behaviors may be preferred to an emphasis on weight per se, weight monitoring is considered useful to both clinician and patient in gauging the adequacy of behavioral interventions. By criteria of the International Obesity Task Force, overweight is classified as BMI >25. Obesity is categorized as Class I (BMI 30-34.9), Class II (BMI 35-39.9), and Class III (BMI $\geq$40).
AGA	• A medical evaluation is needed to identify patients who either

(2002)	have, or are at risk for, obesity-related medical complications. This assessment should include a careful history, physical examination (including determination of BMI), and laboratory tests to identify eating and activity behaviors, weight history and previous weight loss attempts, obesity-related health risks, and current obesity-related medical illnesses. • Weight loss therapy is not recommended for patients with a BMI ^{2}. A BMI of 25.0-29.9 is classified as overweight. Obesity is categorized as Class I (BMI 30-34.9), Class II (BMI 35-39.9), and Class III (BMI $\geq$40).
BWH (2003)	Body Mass Index (BMI). The BMI is the recommended approach for assessing body size in the clinical setting, providing a more accurate measure of body size than weight alone. However, it can overestimate body fat in people who are very muscular, very short, or who have edema, and it underestimates it in people who have lost muscle mass, such as the elderly. The National Heart, Lung, and Blood Institute Overweight and Obesity Classification by BMI (in kg/m^2): • Normal weight -- 18.5-24.9 • Overweight -- 25.0-29.9 • Obesity class 1 -- 30.0-34.9 • Obesity class 2 -- 35.0-39.9 • Obesity class 3 -- $\geq$40.0 Waist Circumference. Excess abdominal fat carries particularly elevated health risks. Waist circumference is the most practical marker of abdominal fat. (Many patients understand this concept as "apple" vs. "pear" shaped.) A waist circumference >88 cm (>35 in) raises cardiovascular disease risk in women. Ethnic and age-related variations in distribution of body fat affect the predictive value of waist circumference. Waist circumference may be a better indicator of risk than BMI for estimating obesity-related disease risk among certain populations, such as Asian-Americans and older people. Waist cutoffs designed for the general population may not apply to very short women (under five feet).
SINGAPORE MOH (2004)	• BMI is the recommended index to define overweight and obesity. It is minimally correlated with height and highly correlated with body fat percentage and levels of disease risk of comorbidities. Body weight alone can be used to follow weight loss and to determine efficacy of therapy. (Grade B, Level III) • Current World Health Organization (WHO) and international

	guidelines recommend BMI cutoffs of 25 and 30 kg/m^2 to define overweight and obesity, respectively. Based on body fat equivalence and comorbid disease risk, BMIs of 23 and 27.5 kg/m^2, respectively have been recommended as cutoff points for public health action in Asians. (Grade C, Level IV) Note: BMI cutoff points are currently being reviewed in the light of new data. • Waist circumference is the most practical anthropometric measurement for assessing a patient's abdominal fat content before and during weight loss treatment. Gender-specific waist circumference cutoffs should be used in conjunction with BMI to identify increased disease risk. (Grade B, Level III) • Current international guidelines recommend waist circumference cutoffs of 102 and 88 cm to define excess risk in males and females, respectively. Based on an Asian-Pacific consensus and our National Health Survey and comorbid disease risk, cutoffs of 90 and 80 cm, respectively, are probably more appropriate for Asians. (Grade C, Level IV)
USPSTF (2003)	The USPSTF found good evidence that BMI, calculated as weight in kilograms divided by height in meters squared, is reliable and valid for identifying adults at increased risk for mortality and morbidity due to overweight and obesity. Persons with a BMI between 25 and 29.9 are overweight, and those with a BMI of $\geq$30 are obese. There are 3 classes of obesity: class I (BMI 30-34.9), class II (BMI 35-39.9), and class III (BMI 40 and above). Central adiposity increases the risk for cardiovascular and other diseases independent of obesity. Clinicians may use the waist circumference as a measure of central adiposity. Men with waist circumferences >102 cm (>40 inches) and women with waist circumferences >88 cm (>35 inches) are at increased risk for cardiovascular disease. The waist circumference thresholds are not reliable for patients with a BMI >35.
Assessment of Other Risk Factors or Comorbidities	
ACPM (2001)	No recommendations offered.
AGA (2002)	• The medical evaluation should include an assessment of obesity-related health risks and current obesity-related medical illnesses. • Obesity-related health risks, the presence of other disease risk factors, and coexisting obesity complications should be used to help determine the need for obesity therapy and the

	aggressiveness of the treatment approach. • The presence of psychiatric illnesses (e.g., severe depression, substance abuse, or binge-eating disorders) should also be assessed, as all of these disorders can derail weight loss efforts.
BWH (2003)	• Clinicians should consider risk factors when deciding upon treatment. Health risks associated with obesity include high blood pressure, type-2 diabetes, coronary heart disease, dyslipidemia, stroke, osteoarthritis, sleep apnea, cancer, and mortality. These risks increase with increasing degrees of overweight and obesity. Specific factors, such as race, ethnicity, age, general and social conditions, may also increase or decrease an individual's health risks at different stages of overweight or obesity.
SINGAPORE MOH (2004)	• In clinical evaluation of patients, practitioners should consider and exclude predisposing factors for, and secondary causes of, obesity. (GPP) • Overweight and obese adults should be screened for comorbid conditions and should be stratified according to their health risks, in particular for cardiovascular disease, prior to the commencement of treatment. (Grade C, Level IV) • The presence of depression and binge eating disorders in obese patients must be evaluated for, with appropriate referral for psychiatric treatment. (Grade B, Level IIa)
USPSTF (2003)	No recommendations offered.
Assessment of Patient Motivation to Lose Weight	
ACPM (2001)	No recommendations offered.
AGA (2002)	• A determination of how much effort the patient is able and willing to make to lose weight is important for guiding treatment options. Several questions should be answered: (1) What is the patient's motivation for losing weight? (2) Are there any major stresses that will make it difficult to focus on weight control? (3) Does the patient have any psychiatric illnesses, such as severe depression, substance abuse, or binge eating disorder, which will derail weight loss efforts? and (4) Can the patient devote a minimal amount of time (e.g., 15 to 30 minutes per day for the next 6 months) that is

	needed for a serious weight loss effort?
BWH (2003)	No recommendations offered.
SINGAPORE MOH (2004)	• Patient motivation is an important prerequisite of weight loss management and should be relatively high before initiating therapy. Proper evaluation of issues related to motivation should be undertaken. (Grade C, Level IV)
USPSTF (2003)	No recommendations offered.
Screening and General Preventive Counseling for Overweight and Obesity	
ACPM (2001)	• Independent of weight or BMI, all adult patients should consistently receive counseling about healthful dietary and physical activity patterns in the context of primary care. Such counseling should be reinforced in the context of specialty care (e.g., cardiology) as dictated by clinical judgment and discretion.
AGA (2002)	• Weight loss therapy is not recommended for patients with a BMI ^{2}. However, providing recommendations for a healthy lifestyle, including dietary and physical activity modification, is reasonable for lean persons who have, or are at increased risk for, future adiposity-related diseases.
BWH (2003)	• Primary care physicians can play an important role in reducing the morbidity and mortality associated with obesity by educating patients about the condition, treating the comorbid conditions, helping to enroll patients in weight loss programs, encouraging regular physical activity and healthy diet, and offering medical or surgical treatment options for obesity when indicated. The original guideline document also provides information about prevention of obesity by describing what constitutes a healthy diet for women.
SINGAPORE MOH (2004)	No recommendations offered.
USPSTF	• The USPSTF recommends that clinicians screen all adult

(2004)	patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults. B recommendation The USPSTF concluded that the benefits of screening and behavioral interventions outweigh potential harms. • The USPSTF concludes that the evidence is insufficient to recommend for or against the use of moderate- or low-intensity counseling together with behavioral interventions to promote sustained weight loss in obese adults. I recommendation The USPSTF found limited evidence to determine whether moderate- or low-intensity counseling with behavioral interventions produces sustained weight loss in obese (as defined by BMI >30 kg/m^2) adults. The relevant studies were of fair to good quality but showed mixed results. In addition, studies were limited by small sample sizes, high drop-out rates, potential for selection bias, and reporting the average weight change instead of the frequency of response to the intervention. As a result, the USPSTF could not determine the balance of benefits and potential harms of these types of interventions. • The USPSTF concludes that the evidence is insufficient to recommend for or against the use of counseling of any intensity and behavioral interventions to promote sustained weight loss in overweight adults. I recommendation. The USPSTF found limited data that addressed the efficacy of counseling-based interventions in overweight adults (as defined by BMI from 25-29.9 kg/m^2). As a result, the USPSTF could not determine the balance of benefits and potential harms of counseling to promote sustained weight loss in overweight adults. Counseling interventions include a variety of approaches aimed at promoting change in diet and/or physical activity. Behavioral interventions include strategies that assist patients to acquire skills, improve motivation, and develop supports. The 5-A framework (Assess, Advise, Agree, Assist, and Arrange) has been used in behavioral counseling interventions and may be a useful tool to help clinicians guide interventions for weight loss. Note: The USPSTF defined intensity of counseling by the frequency of the intervention. A high intensity intervention is more than 1 person-to-person (individual or group) session per month for at least the first 3 months of the intervention. A medium intensity intervention is a monthly intervention and anything less frequent is a low-intensity intervention.

TABLE 3. COMPARISON OF RECOMMENDATIONS FOR TREATMENT/MANAGEMENT OF OVERWEIGHT AND OBESITY	
Setting Goals for Weight Loss Management	
ACPM (2001)	• Treatment goals should focus on long-term outcomes rather than short-term weight loss; as is true of most chronic conditions, obesity appears to require long-term therapy and management.
AGA (2002)	• If the patient is not ready for obesity treatment, the therapeutic goal should be to prevent weight gain and explore barriers to weight reduction. If the patient is ready to lose weight, a structured, goal-oriented treatment plan should be instituted. The goals and expectations should be realistic and carefully discussed, and provisions made for frequent follow-up and long-term contact.

BWH (2003)	• Patients not motivated or unable to lose weight should be urged to avoid further weight gain.
	• Overall goals for weight loss management:
	  • Reduce body weight - a 10 percent loss of the initial body weight is the primary target, since this would result in significant risk reduction.
	  • Maintain lower weight over the long-term. It is better to maintain a moderate loss over the long-term than it is to achieve a greater weight loss that cannot be maintained.
	  • Prevent further weight gain

SINGAPORE MOH (2004)	• It is important to set realistic goals for weight loss and provide sound advice on lifestyle modification. Modest weight loss (e.g., 10% body weight over 6 months) is more realistic and attainable than aiming for weight reduction to ideal body weight, and does result in a reduction in obesity morbidity. (Grade C, Level IV)
USPSTF (2003)	No recommendations offered
Basic Treatment Strategy	
ACPM (2001)	• ACPM endorses the practical guidelines of the National Institutes of Health (NIH) in advising obese and overweight patients (National Heart, Lung, and Blood Institutes. Clinical guidelines on the identification, evaluation, and treatment of

	overweight and obesity in adults: the evidence report. Bethesda, MD: NIH, 1998). • Moderate physical activity for 30-45 minutes, at least 3-5 days per week, should be encouraged for all patients unless specifically contraindicated. Overweight or obese patients should be counseled regarding an energy-reduced or low-calorie diet (800-1,500 kcal/day). • Surgery should be reserved for severely obese subjects (generally, BMI >40). Evidence available at the time that the guideline was developed was insufficient to support any specific behavioral therapy, short-term use of pharmacotherapy, or chronic pharmacotherapy; such interventions should be individualized in accord with clinical judgment. • The lack of clearly effective treatment for obesity once established requires that obesity prevention be addressed consistently in clinical practice. Counseling by clinicians to encourage health-promoting dietary patterns and levels of physical activity in all patients is therefore warranted, both as a means to control weight and to confer health benefits by other means.
AGA (2002)	• The components of the treatment program depend on physician expertise and the availability of support from other professionals. In general, the aggressiveness of the treatment program is related to obesity-related health risk. Alterations in dietary intake and physical activity, supported by behavior modification therapy, are the cornerstones of treatment for all overweight and obese patients. Pharmacotherapy and bariatric surgery can be useful additional treatment options in properly selected patients.
BWH (2003)	• Treatment of overweight and obesity can be achieved through a variety of modalities, including dietary therapy, physical activity, behavior therapy, pharmacotherapy, and surgery. Different treatments are appropriate for different BMI levels. Patients not motivated or unable to lose weight should be urged to avoid further weight gain. Clinicians should consider risk factors when deciding upon treatment.
SINGAPORE MOH (2004)	• A multifaceted or multidisciplinary strategy should be utilized to achieve and maintain weight loss. Depending on patient response, this could be adequately achieved at the primary health care level or tertiary level. (Grade C, Level IV) • The combination of dietary caloric restriction, physical activity and behavioural modification results in greater and more sustained weight loss than the individual modalities. (Grade

	A, Level Ib)
USPSTF (2003)	There is fair to good evidence that high-intensity counseling--about diet, exercise, or both--together with behavioral interventions aimed at skill development, motivation, and support strategies produces modest, sustained weight loss (typically 3-5 kg for 1 year or more) in adults who are obese (as defined by BMI $\geq$30 kg/m^2).
Dietary Restriction	
ACPM (2001)	• Overweight or obese patients should be counseled regarding an energy-reduced or low-calorie diet (800 to 1,500 kcal/day). Background evidence: Dietary modification (dieting) can generally achieve modest, short-term weight reduction. Average weight loss on a low-calorie diet (1,200 kcal/day) of 8.5 kg in 20 weeks has been reported, as has 20 kg over 16 weeks on a VLCD (800 kcal/day). However, a variety of VLCDs often used as a component of commercial weight-loss programs or available through the use of formula diets or drinks have shown only short-term benefits without evidence of long-term success. For most individuals who use dieting as a means to lose weight, it has been reported that most of the weight lost in the early phase (16-20 weeks) is regained within 2-5 years. With sustained intensive counseling, however, maintenance of weight loss is achievable.
AGA (2002)	• Overweight persons (BMI of 25.0-29.9 kg/m^2) with 2 or more cardiovascular risk factors, and those with class I obesity (BMI of 30.0-34.9 kg/m^2), should decrease their energy intake by approximately 500 kcal/d. This energy deficit will result in approximately a 1 pound (0.45 kg) weight loss per week and about a 10% reduction of initial weight at 6 months. • Persons with class II (BMI of 35.0 -39.9 kg/m^2) or III (BMI $\geq$40 kg/m^2) obesity should aim for a more aggressive energy deficit of 500-1,000 kcal/d, which will produce approximately a 1- to 2-pound weight loss per week and approximately a 10% weight loss at 6 months. Several dietary strategies can be used to help patients restrict energy intake. The clinical effectiveness of each approach has been demonstrated in randomized controlled trials. The use of portion-controlled servings can enhance weight loss because obese persons who consume a diet of self-selected table foods tend to underestimate their energy intake. Providing prepackaged prepared meals and liquid formula meal replacements increases the likelihood that patients will be compliant with their prescribed

	energy intake. In addition, low-fat diets help obese patients lose weight. Several short-term studies (≤14 days) have found that energy intake is regulated by the weight of ingested food, rather than by energy content. Therefore, energy intake is inversely correlated with energy density, so consumption of a low-energy density diet can enhance compliance with a low-calorie diet. The energy density of a diet can be decreased by adding water to food, increasing the intake of high-water content foods, such as fruits and vegetables, and limiting the intake of high-energy density foods, such as high-fat and dry (e.g., crackers and pretzels) foods.
BWH (2003)	There is a large popular literature on weight-loss, and many patients prefer to try popular weight loss methods before considering medical approaches. Many of the popular diets have claims that are not supported by data. It is important for physicians to be aware of the specific recommendations of these popular diets, and to be open-minded and flexible about them. Short-interval follow-up appointments should be made to assess the success on each attempt. If patient-initiated diets and programs do not result in significant weight loss, a stepped approach can be taken, based on BMI and risk. Stepped Treatment Approach for Women: • BMI of 25.0 to 26.9 (low to moderate risk) - Healthful eating and/or calorie deficient diet • BMI of 27.0 to 29.9 (moderate to high risk) - LCD (1,000-1,200 kcal/day) • BMI of 30.0 to 34.9 (high to very high risk) - VLCD (525-800 kcal/day) or drug therapy* • BMI of 35.0 to 39.9 (very high to extremely high risk) - VLCD (525-800 kcal/day) or drug therapy* • BMI of ≥40.0 - VLCD (525-800 kcal/day) or drug therapy* *Note: VLCD and drug therapy not approved for use together
SINGAPORE MOH (2004)	• The most important dietary component of weight loss and maintenance is a decrease in caloric intake. Typically, a 500 to 1,000 kcal per day reduction produces the recommended 0.5 to 1 kg per week weight loss. In the absence of physical activity, a diet that contains 1,400-1,500 kcal/day, regardless of macronutrient content, results in weight loss. Sustained dietary modification is necessary to maintain weight loss. (Grade A, Level Ib) • Diets containing different proportions of the major macronutrients, such as moderate-fat balanced nutrient-reduction diets; high-fat, low-carbohydrate diets; and low- or very-low-fat, high-carbohydrate diets have all been shown to reduce weight. Weight loss appears to be more associated with reduced caloric intake and increased diet duration, rather

	than the macronutrient content per se. A diet moderately restricted in total fat, moderate to high in complex carbohydrates, and moderate in protein is the most widely recommended diet. (Grade C, Level IV) • The distribution of food intake should be as even as possible throughout the day, and meals should not be skipped as a weight control method. Meals should be adequately sized so that snacks are not needed between meals. (Grade C, Level IV) • LCDs and VLCDs may be useful shorter term adjuncts (up to 6 months) for weight loss, but sustained modification of food intake is necessary to maintain weight loss. The use of these diets as part of a meal replacement strategy appears useful. The combination of a controlled energy diet (LCD or VLCD), increased physical activity, and behaviour therapy appears to provide the most successful outcome for weight loss and maintenance. (Grade A, Level Ib)
USPSTF (2003)	The most effective interventions combine nutrition education and diet and exercise counseling with behavioral strategies to help patients acquire the skills and supports needed to change eating patterns and to become physically active. No specific recommendations are given concerning dietary restriction.
Physical Activity	
ACPM (2001)	• Moderate physical activity for 30 to 45 minutes, at least 3 to 5 days per week, should be encouraged for all patients unless specifically contraindicated. Background evidence: Exercise in combination with caloric restriction leads to relatively greater fat loss, preserves lean body mass, and has been shown to maintain initial weight loss. Physical activity and the increased muscle mass that results may partially counteract the decline in basal metabolic rate that typically accompanies weight loss, conferring some protection against weight regain. Even in the absence of significant weight loss, regular exercise often confers considerable health benefits, including salutary effects on the lipid profile, improved cardiovascular fitness, enhanced psychological well-being, and reduced risk of mortality.
AGA (2002)	• Physical activity alone is not an effective method for achieving initial weight loss. However, retrospective analyses of data from many weight loss studies suggest that increased physical activity causes long-term weight management and improved health. The amount of physical activity associated

	with successful weight maintenance is considerable: approximately 60 to 90 minutes per day of moderate-intensity activity (e.g., brisk walking) or 30 to 45 minutes per day of vigorous activity (e.g., fast bicycling or aerobics). Therefore, patients should be advised to increase physical activity slowly over time until the target goal is reached. Aerobic exercise has additional health benefits that are independent of weight loss itself. Increased fitness, determined by maximal oxygen consumption during exercise, is associated with a decreased risk of developing diabetes and dying from cardiovascular disease.
BWH (2003)	The Centers for Disease Control and Prevention (CDC) recommends $\geq$30 minutes of accumulated, moderate exercise on most or all days of the week. • Depending on patient's age, symptoms, and risk factors, consider an exercise test for cardiopulmonary disease. • Simple exercise that can be gradually stepped up-such as slow walking or swimming-is best for most obese people. Stress consistency and frequency over duration and intensity. Example: 10 minutes of walking, three days a week. Extra time added in five-minute increments slowly builds the regimen to 30 to 45 minutes, three days a week. Eventually, expand to most or all days. • Lifestyle activities (stair climbing, gardening, housecleaning, and parking further away from destination) count toward goal. • Encourage more strenuous activities as patient progresses (e.g., faster walking, bicycling, rowing, aerobic dance, cross-country skiing, and weight lifting). • High impact activities-jogging, certain aerobic classes, competitive sports-are enjoyable for some, but increase the risk of injury. Exercise supervised by a well-qualified physical trainer may be recommended.
SINGAPORE MOH (2004)	• Current physical activity contributes to weight loss, reduces cardiovascular risk factors (e.g., hypertension and diabetes mellitus) and the risk for coronary heart disease, increases cardiorespiratory fitness independent of weight loss, and decreases body and abdominal fat. (Grade A, Level Ib) The current recommendation of moderate-intensity physical activity for 30 min, 3-5 days per week is largely aimed at reducing cardiovascular disease and overall mortality. (Grade C, Level IV) • To prevent unhealthy weight gain, moderate-intensity

	physical activity for 45-60 min on most days or every day has been recommended. Preventing weight gain after substantial weight loss probably requires about 60-90 minutes per day. Starting at low-to-moderate physical activity for 30-45 min, 3-5 days per week, the intensity, duration, and frequency should be increased gradually. (Grade C, Level IV) • A program of diet plus non-structured, moderate-intensity lifestyle activity appeared as effective as diet plus structured aerobic activity for reducing weight in obese women. Any increase in daily physical activity is likely to have some benefit in obese women. (Grade A, Level Ib)
USPSTF (2003)	The most effective interventions combine nutrition education and diet and exercise counseling with behavioral strategies to help patients acquire the skills and supports needed to change eating patterns and to become physically active. No specific recommendations are given concerning physical activity
Behavior Modification	
ACPM (2001)	• Evidence available to date is insufficient to support any specific behavioral therapy. Clinicians are encouraged to apply prevailing models of behavior modification, such as the Stages of Change, in support of counseling by clinicians for weight control. Background evidence: Cognitive-behavioral therapy is effective in producing negative energy balance through the maintenance of healthy behaviors during active therapy periods but lacks long-term efficacy. Trials that incorporate behavioral therapy show short-term mild to modest benefit, but weight is generally regained after the program of behavioral intervention is terminated.
AGA (2002)	Behavior therapy should be included in any weight loss program to facilitate changes in eating and activity behaviors needed for successful weight loss. Gastroenterologists can incorporate the principles of behavior therapy within their clinical practice by: 1. helping patients develop realistic goals 2. establishing an appropriate treatment plan to achieve small and incremental diet and activity goals 3. encouraging self-monitoring (daily records of food intake and physical activity) 4. helping patients identify and solve problems that are barriers to weight loss 5. scheduling regular follow-up visits with office personnel to

	record weight, review food records, and provide support and encouragement It is often difficult for physicians to provide appropriate behavior modification therapy for obesity because of limitations in time and expertise. Therefore, the use of legitimate local professionals, including psychologists, counselors, and dieticians, and self-help, commercial, and hospital-based obesity treatment programs should be considered. Group behavior therapy, when available, should be considered in patients who have not been able to lose weight with less aggressive treatment approaches. Prospective randomized trials have shown that obese patients treated by group behavior therapy lose ~0.5 kg/week, and ~9% of their initial weight in 20 to 26 weeks of treatment. Patients usually regain about 30 to 35% of their lost weight in the year following treatment. However, persons who maintain regular contact with their treatment providers have better success at achieving long-term weight management.
BWH (2003)	• Behavior therapy is recommended as an adjunct to any other treatment approach in women with a BMI of 25.0 or more Strategies include recording daily eating habits and physical activity; cognitive behavior therapy techniques; identifying and restricting behavior associated with excessive eating; stress management; non-food reward system; and group support. No single behavior therapy appears superior for weight loss. Combined strategies and more intense therapy (more contacts, longer duration) appear to work best.
SINGAPORE MOH (2004)	• Weight loss programs incorporating cognitive behavioural interventions are helpful in achieving weight loss and weight maintenance in the range of up to 10% for between 1 to 5 years of follow-up. (Grade A, Level Ib)
USPSTF (2003)	• The USPSTF recommends that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults. B recommendation Although the USPSTF did not find direct evidence that behavioral interventions lower mortality or morbidity from obesity, the USPSTF concluded that changes in intermediate outcomes, such as improved glucose metabolism, lipid levels, and blood pressure, from modest weight loss provide indirect evidence of health

	benefits. The USPSTF concluded that the benefits of screening and behavioral interventions outweigh potential harms. • The USPSTF concludes that the evidence is insufficient to recommend for or against the use of moderate- or low-intensity counseling together with behavioral interventions to promote sustained weight loss in obese adults. I recommendation The USPSTF found limited evidence to determine whether moderate- or low-intensity counseling with behavioral interventions produces sustained weight loss in obese (as defined by BMI >30 kg/m^2) adults. The relevant studies were of fair to good quality but showed mixed results. In addition, studies were limited by small sample sizes, high drop-out rates, potential for selection bias, and reporting the average weight change instead of the frequency of response to the intervention. As a result, the USPSTF could not determine the balance of benefits and potential harms of these types of interventions. • The USPSTF concludes that the evidence is insufficient to recommend for or against the use of counseling of any intensity and behavioral interventions to promote sustained weight loss in overweight adults. I recommendation. The USPSTF found limited data that addressed the efficacy of counseling-based interventions in overweight adults (as defined by BMI from 25-29.9 kg/m^2). As a result, the USPSTF could not determine the balance of benefits and potential harms of counseling to promote sustained weight loss in overweight adults. Behavioral interventions include strategies that assist patients to acquire skills, improve motivation, and develop supports. The 5-A framework (Assess, Advise, Agree, Assist, and Arrange) has been used in behavioral counseling interventions and may be a useful tool to help clinicians guide interventions for weight loss.
Pharmacotherapy	
ACPM (2001)	• Evidence available to date is insufficient to support short-term use of pharmacotherapy or chronic pharmacotherapy; such interventions should be individualized in accord with clinical judgment. Background evidence: Pharmacotherapy is generally reserved for patients with BMI >30 (>27 if significant comorbid conditions are present). Multiple randomized controlled trials of appetite suppressant drugs, funded principally by the pharmaceutical

	industry, have demonstrated effectiveness in short-term weight loss. Weight is generally regained when medication is discontinued, however, and the safety of long-term medication use is uncertain. Recently approved medications for weight loss include sibutramine, a reuptake inhibitor of norepinephrine and serotonin, and orlistat, an inhibitor of intestinal lipid peroxidase The effect of currently available medications on weight loss appears rather modest, and efficacy may plateau with sustained use. It has not yet been established that long-term weight-loss maintenance can be achieved through use of medications.
AGA (2002)	Overweight patients (BMI 27.0-29.9 kg/m^2) with comorbidities and obese patients (BMI $\geq$30 kg/m^2) are potential candidates for treatment with obesity medications. All patients receiving pharmacotherapy for obesity should also be involved in efforts to change eating and activity behaviors because data from both randomized and nonrandomized trials show that pharmacotherapy alone is not as effective as pharmacotherapy given in conjunction with behavior modification therapy. Pharmacotherapy should not be used as a short-term treatment approach because patients who respond to drug therapy usually regain weight when therapy is stopped. Only 2 medications, sibutramine and orlistat, have been approved for long-term use by the United States Food and Drug Administration. Prospective randomized trials conducted for up to 2 years have shown that weight loss is greater with these agents than with placebo. However, the difference in weight loss between drug and placebo treatment groups is modest.
BWH (2003)	• Drug therapy may be considered for patients with a BMI of 27.0 to 29.9 if patient has at least two concomitant obesity-related risk factors or diseases and if other strategies (regular physical activity, healthful eating and/or calorie deficient diet, behavior therapy) fail to produce recommended weight loss of a pound per week after 6 months. • Drug therapy* may be considered for patients with a BMI $\geq$30.0 (*Note: VLCD and drug therapy not approved for use together). Drug therapy includes: • Appetite suppressants: Phentermine Approved for short-term use (three months). There is a small potential for abuse. Serotonergic agonists: Sibutramine Approved for one year of use. Low abuse potential. Fat malabsorption agents: Orlistat

	Approved for one year of use. Dose-dependent weight loss. No abuse potential. All of these agents have been shown to induce weight loss compared to placebo. They must be combined with low-calorie diet, physical activity, and behavior therapy.
SINGAPORE MOH (2004)	• Drug therapy may be effective if given without lifestyle modification, but is most effective when combined with diet, physical activity, and behaviour modification. (Grade A, Level Ib) • Drug therapy should be considered when BMI $\geq$30 kg/m^2, or when BMI is 27-29.9 kg/m^2 in patients with comorbidities or complications of obesity such as hypertension, type 2 diabetes mellitus, hyperlipidemia, coronary artery disease, and sleep apnea. Commensurate BMI thresholds for action among Asians may be 27.5 and 25-27.4 kg/m^2, respectively. (Grade C, Level IV) Note: BMI cutoff points are currently being reviewed in the light of new data. • The drugs with the widest efficacy and safety data are orlistat (up to 4 years) and sibutramine (up to 2 years). Other drugs which appear relatively safe and effective for 6-12 month therapy include phentermine and mazindol. There is little data on the effectiveness of combining anti-obesity agents. Metformin is the drug of choice in obese diabetics and has been effectively combined with either sibutramine or orlistat for 1 year. (Grade A, Level Ib)
USPSTF (2003)	Orlistat and sibutramine, approved for weight loss by the Food and Drug Administration, can produce modest weight loss (2.6-4.8 kg) that can be sustained for at least 2 years if the medication is continued. There are no data on the long-term (longer than 2 years) benefits or adverse effects of these drugs. Experts recommend that pharmacological treatment of obesity be used only as part of a program that also includes lifestyle modification interventions, such as intensive diet and/or exercise counseling and behavioral interventions. No specific recommendations are given concerning pharmacotherapy.
Obesity Surgery	
ACPM (2001)	• Surgery (gastroplasty and gastric bypass) should be reserved for severely obese subjects (generally, BMI >40).

	Although gastric bypass surgery leads to higher initial weight loss than gastric banding, the complication rate with the former surgery is higher.
AGA (2002)	Patients with class III obesity (BMI $\geq$40 kg/m^2), or those with class II obesity (BMI 35.0-39.9 kg/m^2) and one or more severe obesity-related medical complications (e.g., hypertension, type 2 diabetes mellitus, heart failure, or sleep apnea), should be considered for surgery if they have been unable to achieve or maintain weight loss with conventional therapy, have acceptable operative risks, and are able to comply with long-term treatment and follow-up. The type of surgical procedure depends primarily on the expertise and preference of the surgeon and the patient's BMI. Gastric bypass is the most commonly performed bariatric surgical procedure. Data from several prospective randomized controlled trials demonstrate that weight loss is greater with the gastric bypass procedure than with vertical-banded gastroplasty. On average, patients who have undergone gastric bypass lose two-thirds of their excess weight (one-third of initial weight) within the first 2 years after surgery and maintain a loss of approximately one-half of their excess weight for more than 10 years. Weight loss is similar after either laparoscopic or open gastric bypass, but the laparoscopic approach is associated with fewer postoperative complications, shorter hospital stay, and earlier return to functional life. Therefore, the laparoscopic approach is preferred in appropriate patients when it can be performed by an experienced surgeon. Malabsorptive procedures, such as biliopancreatic diversion with duodenal switch or long-limb gastric bypass, usually cause more weight loss (~three-fourths of excess weight) than generally observed after gastric bypass. Therefore, malabsorptive procedures should be considered as potential options for very obese patients (BMI >50 kg/m^2). However, the weight loss efficacy of malabsorptive and restrictive operations has never been compared in a prospective randomized trial.
BWH (2003)	Surgical intervention may be considered for: • BMI of 35.0 to 39.9 if less invasive methods have failed, comorbid conditions are present, AND a high risk of obesity-related morbidity and mortality exists • BMI of $\geq$40.0 Surgical methods include gastric bypass, vertical banded gastroplasty, or laparoscopic banding.
SINGAPORE MOH (2004)	• Bariatric surgery is the most effective method to reduce weight and maintain weight loss in the severely or morbidly obese. (Grade A, Level Ib) • Because surgery has significant technical issues,

	complications, and cost, and requires extensive pre- and peri-operative preparation, it is usually considered in those with more severe obesity who have failed to control weight by other means and who remain at high risk of medical comorbidities. Post-operative lifestyle modifications, as well as follow-up for complications of surgery, are life-long. (Grade C, Level IV)
	• Indications for considering bariatric surgery are:
	  • Extreme or morbid obesity (BMI $\geq$40 kg/m^2) or severe obesity (BMI $\geq$35 kg/m^2) with medical comorbidities or complications of obesity
	  • Commensurate BMI thresholds for action among Asians may be 37.5 and 32.5 kg/m^2, respectively.
	  • Failure of significant non-surgical attempts at weight reduction
	
	(Grade B, Level III)

USPSTF (2003)	There is fair to good evidence to suggest that surgical interventions such as gastric bypass, vertical banded gastroplasty, and adjustable gastric banding can produce substantial weight loss (28 to >40 kg) in patients with class III obesity. Clinical guidelines developed by the National Heart, Lung, and Blood Institute (NHLBI) Expert Panel on the identification, evaluation, and treatment of overweight and obesity in adults recommend that these procedures be reserved for patients with class III obesity and for patients with class II obesity who have at least 1 other obesity-related illness. The postoperative mortality rate for these procedures is 0.2%. Other complications include wound infection, re-operation, vitamin deficiency, diarrhea, and hemorrhage. Re-operation may be necessary in up to 25% of patients. Patients should receive a psychological evaluation prior to undergoing these procedures. The long-term health effects of surgery for obesity are not well characterized. No specific recommendations are given concerning surgery for obesity.
Maintenance of Weight Loss	
ACPM (2001)	No recommendations offered.
AGA (2002)	No recommendations offered.
BWH (2003)	If weight loss is to be maintained, a weight management program combining dietary therapy, physical activity, and behavior therapy must continue indefinitely. Studies suggest more frequent and long-term contacts with health professionals work best to help

	patients maintain weight. Most common strategies used in successful weight loss maintainers are: • A low-fat, high-carbohydrate diet • Frequent self-monitoring (self-weighing and food records) • Regular physical activity Baseline characteristics that increase the risk of weight regain include: • Recent weight loss (fewer than 2 years) • Larger weight losses (>30% of maximum weight) • Higher levels of depression, disinhibition, and binge eating
SINGAPORE MOH (2004)	• It is recommended that subjects continue with up to 12 months of the weight maintenance program combining behaviour therapy, a low calorie diet, and exercise, after the initial weight loss treatment. (Grade A, Level Ib) • Common behavioral strategies which may enhance successful long-term weight loss maintenance include eating a calorie-restricted, low-to-moderate fat diet, frequent self-monitoring of body weight, recording food intake and physical activity, and maintaining high levels of regular physical activity. (Grade B, Level III)
USPSTF (2003)	Initial interventions paired with maintenance interventions help ensure that weight loss will be sustained.

TABLE 4. BENEFITS AND HARMS	
BENEFITS	
ACPM (2001)	• There is conclusive evidence that obesity is associated with increased morbidity and mortality and imposes a substantial economic burden both at the individual and societal level. Weight reduction, at least in the short term, has been shown in small prospective cohort and randomized controlled trials to confer beneficial health effects. • Studies suggest that a sustained 10% weight loss is expected to extend life expectancy by 2 to 7 months and to reduce expected lifetime medical care costs of chronic medical conditions (diabetes, hypertension, hypercholesterolemia,

	coronary artery disease, and stroke) by $2,200-5,300.
AGA (2002)	• Appropriate management/treatment of obesity in adults • Decreased prevalence of obesity • Weight loss in adults and subsequent improvement in or elimination of obesity comorbidities, decrease in risk of future obesity-related medical complications, and improvement in quality of life and functioning
BWH (2003)	• Appropriate assessment and management of obesity in women • Reduction in morbidity and mortality associated with obesity
SINGAPORE MOH (2004)	General approaches and overall benefits: • Successful weight loss reduces risk of obesity-related morbidity and mortality, including cardiovascular diseases, hypertension, diabetes mellitus, sleep apnea, arthritis, cancer, and gall bladder disease. Weight loss has a beneficial effect on glucose tolerance, lipid profile, and blood pressure • Weight loss reduces obesity-related social pressures, including ridicule, discrimination, and job bias, which can result in loss of self-esteem and motivation, depression, and other mental health problems • Successful weight loss reduces obesity-related health costs, both those directly attributable to treatment of associated chronic complications, and indirect costs associated with lost productivity, absenteeism, and loss of future earnings
USPSTF (2003)	The Effectiveness of Interventions on Weight Loss Counseling and Behavioral Interventions Counseling and behavioral interventions showed small to moderate degrees of weight loss sustained over at least 1 year. Counseling interventions led to weight changes in the range of +1 to -6 kg or from -4 to -8% of body weight. Although several trials were of good quality, most were judged only fair, with limitations such as small sample size, potential selection bias (trials often enrolled volunteers), and high drop-out rates. Studies tended to report mean group weight change and not frequency of response to the interventions. Trials of higher-intensity interventions (defined by the USPSTF as person-to-person meetings more than once a month for at least the first 3 months) and combinations of interventions appeared to promote greater weight loss than trials of lower-intensity interventions. Among 11 RCTs evaluating high-

	intensity interventions, only 3 explicitly stated the location of the interventions: 2 were conducted in large research clinics and 1 was conducted in a primary physician's office. The 11 RCTs used a variety of health professionals to deliver the interventions, including physicians, psychologists, dieticians, behavioral therapists, exercise instructors, and multidisciplinary teams. Four RCTs using high-intensity interventions achieved significant reductions in weight or prevention of weight gain in the treatment groups (average loss: 2.7-5.5 kg at 12 months to more than 2 years of follow-up). Trials with follow-up beyond 1 year tended to show a loss of effect, but several studies showed a modest weight loss maintained at 24 to 36 months. Weight loss methods may need to be paired with longer-term maintenance interventions for sustained improvement. The Effectiveness of Weight Loss on Intermediate Outcomes Weight reduction of 5 to 7% body weight is associated with lower incidence of diabetes, reduced blood pressure, and improved dyslipidemia. Greater weight loss has been linked with more dramatic improvements in glycemic control and lipids in limited surgical (non-RCT) outcomes data. Surgical cohort studies suggest that large amounts of weight loss may be linked with dramatic improvements in glucose metabolism. Surgically treated patients are more likely to have resolution of diabetes, hypertension, and certain dyslipidemias than patients who do not undergo surgery. The Effectiveness of Weight Loss on Clinical Outcomes The USPSTF searched for evidence that weight loss can affect mortality, morbidity, mental health, and daily functioning, but found the evidence severely limited. There are no strong data to demonstrate that weight loss reduces mortality. Moderate intentional weight loss (510% of initial body weight) has been shown to reduce the severity of comorbidities associated with obesity, and limited observational data suggest that intentional weight loss in the obese can lead to reduced mortality. Two recent trials provide strong evidence that behaviorally mediated weight loss can prevent diabetes. One trial evaluating 2 types of behavioral therapy showed borderline improved self-esteem in both treatment groups. The USPSTF found mixed evidence of improvements of secondary health outcomes among the short-term pharmacotherapy trials.
HARMS	
ACPM (2001)	Current weight-loss methods are not without risk. Weight cycling because of repeated dieting has been associated with cardiovascular events and increased mortality in retrospective cohort studies, although a meta-analysis failed to corroborate

	those findings. In the past, very low calorie diets were associated with cardiac arrhythmia related to myocardial protein loss and electrolyte abnormalities. Other significant side effects of very low calorie diets include gout, gallstones, fatigue, hair loss, cold intolerance, and diarrhea, but risks are lower and generally manageable in a supervised medical setting with adequate replenishment of essential amino acids and micronutrients. Gastroplasty is associated with gastric ulceration, perforation, and bowel obstruction, but such risks have declined with the advent of laparoscopy.
AGA (2002)	Adverse Effects of Medications • Sibutramine. The most common side effects are dry mouth, headache, constipation, and insomnia, which are usually mild and transient. Sibutramine also causes a dose-related increase in blood pressure and heart rate that usually occurs in the first few weeks of treatment and lasts as long as the drug is taken. • Orlistat. The most common side effects are related to orlistat's action on gastrointestinal lipases. In 1- and 2-year trials, approximately 70 to 80% of subjects treated with orlistat experienced one or more gastrointestinal events (fatty/oily stool, increased defecation, oily spotting, soft stool, liquid stools, abdominal pain, fecal urgency, flatulence, flatus with discharge, fecal incontinence, oily evacuation) compared with approximately 50% to 60% of those treated with placebo. Long-term orlistat treatment can affect the homeostasis of certain fat-soluble vitamins. Also, orlistat can have medically significant effects on the absorption of lipophilic medications if both drugs are taken simultaneously. There is a theoretical risk that long-term orlistat therapy may increase the risk of specific gastrointestinal diseases, such as gallstones and colon cancer. Complications Associated with All Bariatric Surgical Procedures • Mortality. Perioperative mortality rate after open obesity surgical procedures reported in studies containing large numbers of patients is usually • Anastomotic leak with peritonitis. The leak rate after open gastric bypass is approximately 2.5% in most series, and the mortality risk from this complication is approximately 0.3%. • Pulmonary embolism • Gallstones. Gallstones will form in approximately one third of patients within 6 months after a gastric restrictive procedure; the incidence may be higher in patients who have had a malabsorptive procedure. • Incisional hernia • Wound infections

	Complications Associated with Specific Bariatric Surgical Procedures • Gastric bypass procedure (GBP). Complications specifically related to the GBP include early complications of hemorrhage, gastrointestinal leak leading to peritonitis, splenic injury, wound infection, and late complications of stomal stenosis, marginal ulcers, staple line disruption, dilation of the bypassed stomach, internal hernias, specific nutrient deficiencies, and dumping syndrome. • Gastroplasty. Complications specifically related to gastroplasty include stomal stenosis, staple line disruption, erosion of the band, and increased gastroesophageal reflux. Stomal stenosis prevents adequate nutrient intake and causes dehydration and vitamin deficiencies. In contrast to the GBP, gastroplasty does not cause dumping syndrome or iron or vitamin B12 deficiency. • Laparoscopically inserted adjustable silicone gastric band (LASGB). Complications of the laparoscopically inserted adjustable silicone gastric band are less common and less severe than those that occur with either the gastric bypass procedure or gastroplasty. These complications include band slippage, esophageal dilatation, erosion of the band into the stomach, band or port infections, and balloon or system leaks that lead to inadequate weight loss. • Biliopancreatic diversion. This procedure causes more nutritional abnormalities (e.g., osteoporosis) and gastrointestinal complications (e.g., frequent, foul-smelling steatorrheic stools) than gastric restrictive procedures because of malabsorption of protein, fat, fat-soluble vitamins, iron, calcium, and vitamin B12. The size of the gastric pouch is inversely correlated with the risk of protein deficiency, which can occur in 100% of patients when the pouch is only 30 mL in size.
BWH (2003)	Complications of Obesity Surgery • About 25% of patients experience nausea and vomiting for two weeks post-operatively. • Other complications include mortality, leak/sepsis, outlet stenosis, peptic ulceration, anemia, iron deficiency, folate deficiency, B12 deficiency, staple disruption, surgical revision, and band slippage/pouch dilation Adverse Effects of Medication • Side effects of sibutramine include dry mouth and insomnia. Increases in pulse rate and systolic and diastolic blood pressures in hypertensive subjects have been noted. • Side effects of orlistat include flatus, fecal incontinence, oily

	spotting, and decreased absorption of vitamins A, E, and beta-carotene.
SINGAPORE MOH (2004)	Nutritional Inadequacy of Diets • Balanced, moderate-fat diet may result in micronutrient deficiencies if food choices are poor. • High-fat, low-carbohydrate diets are high in saturated fat and cholesterol and low in vitamins A, B1, B6, E, folate, calcium, magnesium, iron, potassium, and dietary fibre, and require supplementation. • Very low-fat diets are deficient in B12, E, and zinc. Complications of Bariatric Surgery • Bariatric surgery has significant technical issues, complications, and cost, and requires extensive pre- and peri-operative preparation; post-operative lifestyle modifications, as well as follow-up for complications of surgery, are life-long Adverse Effects of Medications • Sibutramine - mild increases in blood pressure and pulse rate, dry mouth, headache, insomnia, and constipation • Phentermine - dry mouth, insomnia, palpitations, euphoria • Mazindol - insomnia, agitation, and dizziness • Ephedrine - adverse psychiatric, autonomic, gastrointestinal, cardiac effects, and death; the easy availability and potential for abuse are major drawbacks • Topiramate - paresthesia, diarrhea, somnolence, and dysgeusia • Zonisamide - fatigue • Orlistat - oily diarrhea with urgency in patients noncompliant with reduced-fat diet
USPSTF (2003)	• The U.S. Preventive Services Task Force did not find studies evaluating the harms of screening, counseling, or behavioral interventions. Nonetheless, a potential risk does exist, particularly as the stigma of obesity is well established. Possible labeling effects of diagnosis may occur.

TABLE 5: EVIDENCE RATING SCHEMES AND REFERENCES

SINGAPORE MOH (2004)	Grades of Recommendations Grade A (evidence levels Ia, Ib): Requires at least one randomised controlled trial as part of the body of literature of overall good quality and consistency addressing the specific recommendation Grade B (evidence levels IIa, IIb, III): Requires availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation Grade C (evidence level IV): Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates absence of directly applicable clinical studies of good quality. GPP (good practice points): Recommended best practice based on the clinical experience of the guideline development group Levels of Evidence Level Ia: Evidence obtained from meta-analysis of randomised controlled trials Level Ib: Evidence obtained from at least one randomised controlled trial Level IIa: Evidence obtained from at least one well-designed controlled study without randomisation Level IIb: Evidence obtained from at least one other type of well-designed quasi-experimental study Level III: Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies, and case studies Level IV: Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities
USPSTF (2003)	Strength of Recommendations The Task Force grades its recommendations according to one of 5 classifications (A, B, C, D, I) reflecting the strength of evidence and magnitude of net benefit (benefits minus harms): A The USPSTF strongly recommends that clinicians routinely provide

	[the service] to eligible patients. The USPSTF found good evidence that [the service] improves important health outcomes and concludes that benefits substantially outweigh harms. B The USPSTF recommends that clinicians routinely provide [the service] to eligible patients. The USPSTF found at least fair evidence that [the service] improves important health outcomes and concludes that benefits outweigh harms. C The USPSTF makes no recommendation for or against routine provision of [the service]. The USPSTF found at least fair evidence that [the service] can improve health outcomes but concludes that the balance of benefits and harms is too close to justify a general recommendation. D The USPSTF recommends against routinely providing [the service] to asymptomatic patients. The USPSTF found at least fair evidence that [the service] is ineffective or that harms outweigh benefits. I The USPSTF concludes that the evidence is insufficient to recommend for or against routinely providing [the service]. Evidence that [the service] is effective is lacking, of poor quality, or conflicting and the balance of benefits and harms cannot be determined. <u>Strength of Evidence</u> The USPSTF grades the quality of the overall evidence for a service on a 3-point scale (good, fair, poor): Good Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes. Fair Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality,

	or consistency of the individual studies, generalizability to routine practice, or indirect nature of the evidence on health outcomes. Poor Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

GUIDELINE CONTENT COMPARISON

The American College of Preventive Medicine (ACPM), American Gastroenterological Association (AGA), Brigham and Women's Hospital (BWH), Singapore Ministry of Health (Singapore MOH), and the United States Preventive Services Task Force (USPSTF) present recommendations for assessment/screening and/or treatment of overweight and obesity in adults and provide explicit reasoning behind their judgments. Singapore MOH and USPSTF rate the quality of their recommendations and the type of evidence supporting them. ACPM and USPSTF include a review of the evidence supporting their recommendations, and they also compare their recommendations with those from other national organizations; ACPM includes in their comparison the 1996 USPSTF recommendations for screening for obesity. Both AGA and USPSTF provide technical/evidence reviews to accompany their guideline recommendations, while the Singapore guideline includes an extensive discussion of the evidence in the guideline document. Recommendations from BWH are based on a comprehensive review of recent medical literature and reflect the expertise of leading clinicians at Brigham and Women's Hospital. All of the developers rely heavily on the 1998 National Heart, Lung, and Blood Institutes guideline titled "Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults."

Although all the organizations address the issues of assessment/screening and treatment of overweight and obesity in adults, there are some differences among the guidelines in scope. Recommendations from the Singapore MOH, for example, focus on the Asian population, and therefore ethnic differences have been taken into account in calculating BMI cutoffs for overweight and obesity. Singapore MOH also provides guidelines for management of obesity in children and adolescents; the pediatric population is not considered by the other guideline groups. The BWH guidelines are intended for women only. The USPSTF guideline focuses primarily on screening/counseling and behavioral interventions, although the guideline does review evidence for drug therapy and bariatric surgery for obese individuals. The AGA guideline provides and in depth review of various bariatric surgical procedures.

Areas of Agreement

Key Measures of Overweight and Obesity

All five guidelines are in general agreement that measurement of body mass index (BMI), defined as weight in kilograms/height in meters^2 (kg/m^2), is the most reliable and valid method for gauging overweight and obesity in adults. BMI is also well correlated with degree of risk for obesity-related complications, such as cardiovascular disease. All five groups acknowledge World Health Organization (WHO), National Heart, Lung, and Blood Institute (NHLBI), and other national and international guidelines for classification of overweight and obesity: a BMI of 25.0-29.9 is classified as overweight; obesity is categorized as Class I (BMI > 30-34.9), Class II (BMI 35-39.9), and Class III (BMI $\geq$40). The Singapore MOH guidelines also provide lower cutoffs for the Asian population for all BMI classifications.

The importance of waist circumference as an indicator of cardiovascular and other disease risk is also emphasized by three of the groups (BWH, Singapore MOH, and USPSTF). A waist circumference of >88 cm (>35 inches) in women and >102 (>40 inches) in men indicates increased risk, independent of BMI. Lower values of waist circumference should be used for Asians (see Singapore MOH guidelines in Table 2 above).

Assessment of Other Risk Factors or Comorbidities

AGA, BWH, and Singapore MOH recommend screening for comorbid conditions, particularly obesity-related health risks, as part of the medical evaluation. The presence or absence of such conditions is helpful in determining the intensity of therapy. AGA and Singapore MOH also recommend screening for psychiatric disorders, such as depression and binge eating, which may affect the success of therapy. BWH also points to the presence of depression, disinhibition, and binge eating at baseline as factors that increase the likelihood of weight regain after an initial weight loss.

Treatment/Management of Overweight and Obesity in Adults

All five guidelines agree that the basic treatment strategy for weight loss should be multifaceted, combining dietary restriction, behavior modification, and increased physical activity. ACPM, AGA, BWH, and Singapore MOH emphasize the need for setting realistic and modest weight-loss goals and for maintaining the loss over the long term. These four groups also are in general agreement that the aggressiveness of the dietary restriction should correlate with BMI and the presence of any comorbid conditions (i.e., those with higher BMIs or more risk factors should aim for a higher daily energy deficit in their diets). The total calorie intake, rather than the composition of the diet in terms of macronutrients (total fat, carbohydrates, protein), is the most important factor for weight loss.

All of the groups agree that the use of pharmacotherapy (e.g., orlistat, sibutramine, appetite suppressants) should generally be reserved for patients with at least class I obesity (BMI $\geq$30*). ACPM, AGA, BWH, and Singapore MOH, however, state that patients with BMIs $\geq$27* with comorbid conditions might also be considered for drug therapy.

*Note: BMI thresholds for drug therapy in Asians are lower, at 27.5 and 25-27.4 with comorbid conditions, respectively; see Table 2 above under Singapore MOH

All groups emphasize that drug therapy should be used only in combination with diet, exercise, and behavioral interventions. They also emphasize that drug therapy is not recommended with VLCDs.

All groups also agree that the use of surgical interventions for obesity should be reserved for patients with extreme obesity (generally BMI $\geq$40*) or those with a BMI $\geq$35*and severe comorbid conditions.

*Note: BMI thresholds for surgical treatment in Asians are lower, at 37.5 and 32.5 with severe comorbid conditions, respectively; see Table 2 above under Singapore MOH.

Maintenance of Weight Loss

AGA, BWH, Singapore MOH, and USPSTF agree that weight loss maintenance requires a combination of dietary restriction, regular sustained physical activity, and self-monitoring.

Areas of Differences

The only major difference among the five guideline groups concerns the initiation of weight-loss interventions for adults who are simply overweight (i.e., BMI of 25.0-29.9). USPSTF is the only group that does not recommend for or against use of interventions for weight loss in "overweight" adults. After examining available evidence, USPSTF concluded that the effectiveness of counseling and behavioral interventions used with obese people may not be generalizable to adults who are only overweight but not obese.

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